

GEPHE SUMMARY

cadherin (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] cadherin [^] #gephebase-summary-title)	Gephebase Gene	GP00002449	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category= [^] Physiology [^] #gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; Bt Cry2Ab toxin) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Xenobiotic resistance (insecticide; Bt Cry2Ab toxin)<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=[^]Xenobiotic resistance (insecticide; Bt Cry2Ab toxin)[^]#gephebase-summary-title)	Trait		
Pectinophora gossypiella - Bt-Cry1Ac susceptible	Trait State in Taxon A		
Pectinophora gossypiella - Bt-Cry1Ac resistant lab selected strain	Trait State in Taxon B		
Taxon A	Ancestral State		
Experimental Evolution (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Experimental Evolution [^] #gephebase-summary-title)	Taxonomic Status		
		Taxon A	Taxon B
	Latin Name		Latin Name
Pectinophora gossypiella (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Pectinophora gossypiella<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Pectinophora gossypiella[^]#gephebase-summary-title)		Pectinophora gossypiella (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Pectinophora gossypiella<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Pectinophora gossypiella[^]#gephebase-summary-title)	
	Common Name		Common Name
pink bollworm		pink bollworm	
	Synonyms		Synonyms
pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gossypiella		pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gossypiella	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicoiinae; Pectinophora		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicoiinae; Pectinophora	
	Parent		Parent
Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13190)		Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13190)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13191)		13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13191)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

-	Generic Gene Name	A0A1B0RHM4 (http://www.uniprot.org/uniprot/A0A1B0RHM4)	UniProtKB Helicoverpa zea
-	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)			
	GO - Biological Process		
GO:0007156 : homophilic cell adhesion via plasma membrane adhesion molecules (https://www.ebi.ac.uk/QuickGO/term/GO:0007156)			
	GO - Cellular Component		
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)			

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^Yes^#gephebase-summary-title))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Coding^#gephebase-summary-title))

Aberration Type

Insertion ([https://www.gephebase.org/search-criteria?/and+Aberration Type=^Insertion^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=^Insertion^#gephebase-summary-title))

Insertion Size

-

Molecular Details of the Mutation

insertion into PgCad1 of an active chicken repeat (CR1) retrotransposon designated CR1-1_Pg. Unlike most other CR1 elements CR1-1_Pg is intact and transcribed by a flanking promoter. It contains target site duplications and has a relatively low number of copies. Examination of transcripts from the PgCad1 locus revealed that CR1-1_Pg disrupts both the cadherin protein and a long noncoding RNA of unknown function.

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Candidate+Gene^#gephebase-summary-title))

Main Reference

Three cadherin alleles associated with resistance to *Bacillus thuringiensis* in pink bollworm. (2003) (<https://pubmed.ncbi.nlm.nih.gov/12695565>)

Authors

Morin S; Biggs RW; Sisterson MS; Shriver L; Ellers-Kirk C; Higginson D; Holley D; Gahan LJ; Heckel DG; CarriÃre Y; Dennehy TJ; Brown JK; Tabashnik BE

Abstract

Evolution of resistance by pests is the main threat to long-term insect control by transgenic crops that produce *Bacillus thuringiensis* (Bt) toxins. Because inheritance of resistance to the Bt toxins in transgenic crops is typically recessive, DNA-based screening for resistance alleles in heterozygotes is potentially much more efficient than detection of resistant homozygotes with bioassays. Such screening, however, requires knowledge of the resistance alleles in field populations of pests that are associated with survival on Bt crops. Here we report that field populations of pink bollworm (*Pectinophora gossypiella*), a major cotton pest, harbored three mutant alleles of a cadherin-encoding gene linked with resistance to Bt toxin Cry1Ac and survival on transgenic Bt cotton. Each of the three resistance alleles has a deletion expected to eliminate at least eight amino acids upstream of the putative toxin-binding region of the cadherin protein. Larvae with two resistance alleles in any combination were resistant, whereas those with one or none were susceptible to Cry1Ac. Together with previous evidence, the results reported here identify the cadherin gene as a leading target for DNA-based screening of resistance to Bt crops in lepidopteran pests.

Additional References

Insertion of an intact CR1 retrotransposon in a cadherin gene linked with Bt resistance in the pink bollworm, *Pectinophora gossypiella*. (2011) (<https://pubmed.ncbi.nlm.nih.gov/21815956>)

RELATED GEPHE

Related Genes

1 (ABCA2) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=^13191^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=^13191^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

6 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^cadherin^/and+Taxon ID=^13191^/or+Gene Gephebase=^cadherin^/and+Taxon ID=^13191^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^13191^/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^13191^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

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